

good introduction to the scientific aspects of botany before he reaches the professional details as to drugs. The illustrations are well selected and admirably executed.—J. M. C.

BERGEN and DAVIS have prepared a manual⁵ to accompany their *Principles of botany*, reviewed in this journal (43:64. 1907). As a guide to teachers not familiar with material or its use the manual should prove of great service. As in every other manual, a selective use of the material is expected, and hence almost any elementary teacher with almost any length of course and any kind of material may find helpful suggestions.—J. M. C.

NOTES FOR STUDENTS

Phototropism.—Exactly opposite results to those of HABERLANDT⁶ have been reached by KNIEP⁷ working in PFEFFER's laboratory. By painting with paraffin oil the surface of leaves of a number of species cited by HABERLANDT in his *Lichtsinnesorgane* and covering this layer of oil with thin sheets of mica, or in the case of humpy leaves with thin paper, KNIEP eliminated the lens-action of the epidermal cells, to which HABERLANDT ascribes the perception of light. But whereas HABERLANDT in similar experiments, using water instead of oil for obviating the lens-action, found that the leaves do not respond to oblique light, KNIEP finds that they do, behaving just as the control plants without oil. KNIEP devised ingenious methods of shading the petiole completely, excluding even the light transmitted through the blade at the point of attachment of the petiole. He also adapted the method of conducting light through a glass rod, once proposed for microscope illumination, to the illumination of his experimental leaves.

The increasing number of squarely contradictory results in the field of irritable phenomena makes it evident that there is need of more cautious analysis of the possible factors and more extended and careful experimentation before reaching and publishing conclusions.—C. R. B.

Secondary thickening.—Last year URSPRUNG published a preliminary note in the *Berichte* of the German Botanical Society,⁸ declaring that the pith in *Sambucus nigra* continued its growth in the second and third year, and that even the wood cells were capable of dividing and increasing the thickness of their walls as well as their diameter. Although it is a well-known fact that these cells are all dead, SCHELLENBERG⁹ goes to the trouble of demolishing URSPRUNG's foolish allegations in all sobriety and with all the enginery of original research. As URSPRUNG gave measurements which might have misled, perhaps this ponderous refutation was necessary; but it has its humorous aspect.—C. R. B.

⁵ BERGEN, JOSEPH Y., and DAVIS, BRADLEY M., Laboratory and field manual of botany. pp. viii + 257. Boston: Ginn and Company. 1907.

⁶ BOT. GAZETTE 42:399. 1906.

⁷ KNIEP, HANS, Ueber die Lichtperzeption der Laubblätter. Biol. Centralbl. 27:97-106, 129-142. figs. 28. 1907.

⁸ URSPRUNG, A., Ueber die Dauer des primären Dickenwachstums. Ber. Deutsch. Bot. Gesells. 24:493. 1906. Cf. BOT. GAZETTE 43:294. 1907.

⁹ SCHELLENBERG, H. C., Ueber das primäre Dickenwachstum des Markes von *Sambucus nigra*. Ber. Deutsch. Bot. Gesells. 25:8-16. 1907.